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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014, giving full name, rank, corps, and old and new addresses.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

FEATURE ARTICLE

Drugs Are Double-Edged Swords*

By Dale G. F. Friend M D. Journal of the American Pharmaceutical Assn., NS4(5): 221-225, May 1964. Permission for republication from this original source of the article has been granted by Dr. Friend and by the Editor of the Journal of the APA - Mr. George B. Griffenhagen.

When I graduated in 1935 from medical school, we had very few specific and highly potent remedies available. Then came the sulfas, penicillin and a whole flood of antibiotics. Through the enthusiasm generated by these agents in the field of medicinal chemistry literally hundreds of agents have come. These are not weak drugs; these are agents that have great potency. They have great possibilities of doing good and they have equal possibilities of doing harm. We have actually been propelled into this situation and many of us who were graduated even 15 years ago have been slow to recognize how serious this impact has been in medical practice. I am surprised at times that any physician can practice sensible medicine with the great number of agents that he has available and the tremendous amount of information he must get together to handle these agents wisely.

Information now being gathered at Peter Bent Brigham Hospital will provide background for the difficulties in today's practice of medicine. For every patient discharged from the hospital a record on drug reactions is filled out giving the following information–What drug was used? Did the patient have a reaction? What type of reaction did he have? What happened to the patient?

We have collected data for about nine months and are finding that over two percent of all patients who are discharged from the hospital have drug reactions. Some of these are minor and some are very serious.

Is this a new problem? We used to have iatrogenic disease created by physicians for things that they did to their patients. Up until about the turn of the century most of these iatrogenic diseases came about through surgery. Something went wrong with the patient–he lost a limb or an eye or had some serious complication. But since that time, and now, without any doubt, the greatest number of iatrogenic-created problems are coming from our drug therapy. The two percent reactions do not represent by any means the total number of people who are getting drug reactions. As we encourage our house officers and physicians to report every type of drug reaction, these figures will go much higher.

Iatrogenic disease has a parallel in so-called civilian habits. Students of philosophy know that Pythagoras was not only a mathematician but also a Greek philosopher. He set down a series of rules and regulations for his followers. Among these rules was a restriction on eating beans. Philosophers down through the centuries have laughed at this, pointing it out as one of the

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* Adapted from a paper presented at the Federal Services Seminar, Nov. 7, 1963, in Washington, D. C.

peculiarities of Pythagoras. But actually, he was wise. There are certain beans that can cause severe sensitivity with destruction and hemolysis of blood which can be very dangerous and even result in death. Very recently we have found a drug used in the treatment of malaria called primaquine which in certain people destroys blood. It causes hemolysis and jaundice and can cost a person his life. Many people of Mediterranean origin and many Negro soldiers were exposed to this drug and were inflicted with jaundice. These patients, we finally found, had a defect in their red blood cells in which a certain enzyme was lacking. When these individuals are given this drug and also this particular bean, they will develop a severe reaction. So actually, Pythagoras knew his beans.

In ancient times a very famous king of Babylon named Hammurabi really took the first action against iatrogenic disease. He was very much concerned about physicians' fees and what to do in case the physicians had untoward results. The Code of Hammurabi states that if a doctor causes loss of life or limb in the case of a gentleman, he shall have his hands cut off. In the case of a slave, he will render equal value–slave for slave. This is a pretty serious approach to the problem of compensation for iatrogenic disease. Our approach now is to make physicians and pharmacists pay for untoward reactions that occur in patients.

For example, when a physician prescribes a drug for a patient, he is carrying out an experimental procedure. No matter how the drug may have been used or how many times it has been prescribed or to how many thousands of people it has been given, there is a possibility at any time of untoward reactions occurring.

In 1956, the Council on Drugs of the American Medical Association set up a program to check on blood dyscrasias created by drugs. It asked for information on various types of damages that occurred to the hematopoietic system. Investigators found that about 31 percent of the people who get drug reactions of the hematopoietic system have aplastic anemia and 38 percent have agranulocytosis.

There are now established adverse drug reaction committees in various hospitals who report diseases that are created by drugs but there is still much to be done. Hospital pharmacists are also engaged in this activity of collecting material to report on adverse drug effects. The AMA Council on Drugs has established a nationwide reporting system and the Food and Drug Administration has set up a similar system. Sooner or later these groups must get together, pool all their data and try to come out with some unified report in which we can get a more accurate idea of exactly what is going on in this field.

Not many years ago, Robert Moser published a very important article in which he pointed out some 40 new diseases created by medical progress. Most of these were diseases resulting from the effect or adverse effect of drugs. They are new diseases that have been created by drugs themselves. Time and again the skilled physician who deals with drug effects has to step

in and stop the use of a drug to prevent a patient from developing some serious complication. The diagnosis of drug complications is getting to be a very important field of medical science. Let us look into some of the mechanisms behind these so-called iatrogenic diseases resulting from drug therapy and learn what things are likely to happen.

Everybody should know the dosage of the drug he is going to use and should follow instructions explicitly. Unfortunately, in the case of many of our newer drugs, the exact dose varies with individuals. If physicians are to get maximum benefits from any agent in any individual patient at the particular time of his illness, he must titrate the dose to the patient's needs. For example, a patient on full digitalization who receives a diuretic could be in danger of potassium depletion.

Patients who have ulcers or irritated stomachs are given agents which increase irritation or activate ulcers. Often I have to tell a house officer— "Don't give large doses of reserpine. All you are doing is increasing the secretion of hydrochloric acid. You may activate or create an ulcer. Be careful. Adjust the dose carefully. Don't create an ulcer all in the course of treating mild hypertension."

We give excessive doses of some of our drugs. We often give huge amounts of iron and enormous amounts of iodides. Neither one of these is needed in such large doses by the great majority of patients. We can give iron in much smaller doses, take a little longer for the anemia to be overcome and not have a person develop severe irritation of the gastro-intestinal tract. The more of these foreign molecules which are put in the human organism, the greater is the possibility of getting some kind of reaction.

Some of our new drugs confuse physicians. For example, I was called in to see a patient in emergency who was in coma and nearly dead. What had happened? The dose of tolbutamide said 3.0 grams the first day, 2.0 grams the next, etc. Here was an elderly lady of 75 with a very slight elevation of sugar who suddenly received 3.0 grams of tolbutamide and went into hypoglycemia. She was nearly dead before the trouble was discovered and she was brought out of her coma. Deaths have occurred from this reaction.

We must pay more attention to pharmacological aspects other than the principal effects that we are seeking. Very few drugs have one specific action. Most drugs have several. Some are almost as prominent as the major effect. We must know these other reactions of drugs because they may have serious implications as far as patients are concerned.

As an example, atropine is used to relieve a bowel spasm but it can throw a patient into severe glaucoma or paralyze his bladder so he can't urinate, particularly if he is an elderly gentleman with chronic prostatitis. Urinary retention in turn can lead to very serious problems with catheterization and infection which may cost the patient his life. If he is given enough atropine, his bowel may suddenly go into complete paralysis and he will develop obstipation.

For many agents these other effects are known—for example, morphine causes nausea and vomiting and itching of the skin. Patients also lose their

vasomotor reflexes. If they stand up, their blood pressure falls and they may faint.

Other factors to consider are absorption, duration of action and elimination of the drug. Many of our iatrogenic diseases come from a lack of proper information on these aspects. For example, if under normal circumstances only five percent of a highly potent drug is absorbed in the gastrointestinal tract, there is a possibility under different conditions that seven or eight percent will be absorbed. If so, an ideal situation exists for a toxic reaction. If five percent gives a good clean clinical response and suddenly the absorption is increased to eight percent, a severe toxic effect may occur. Many drugs have come on the market which are highly potent but have limited absorption and may create toxic symptoms if the absorption becomes a little too high. We must always look with a certain amount of suspicion on a highly potent drug that is absorbed to a very small extent because this opens the pathway to possible serious toxic effects.

One must know something about the metabolism of a drug. How long does it stay in the body? Is it removed by the kidneys? For example, if a drug is removed a hundred percent by the kidney and takes quite a time to be eliminated, a great deal of care should be used in giving it to an elderly patient with poor renal reserve. A young man of 25 with one hundred percent kidney function has a tremendous kidney reserve and can handle emergencies very easily. But a man of 75 doesn't have this reserve. He has lost it as the years have gone by and although his kidneys may be functioning normally enough and holding him, if he is suddenly subjected to an extra strain, he can go into a toxic state because he does not have enough reserve.

I was called in to see a patient with a skin rash. He was receiving a penicillin and streptomycin mixture—it was believed the patient had a penicillin reaction and the staff wanted me to see if there was anything that could help. Here was an old gentleman, who had albumin in his urine, stretched flat on his back with a broken leg getting enormous doses of penicillin and streptomycin. It is true that he had a skin reaction. But when I held my finger in front of his eyes they were dancing with nystagmus. He obviously had impaired renal excretion already and he had lost his reserve as the years went by. He couldn't eliminate the streptomycin as rapidly as he was receiving it and he was already getting a vestibular reaction. They could have healed his leg and cured his infection, but he would never have walked again because his vestibular function would have been gone.

Another principle is interference with metabolic processess. For example, mineral oil washes out vitamin A, D, and K from the bowel. But how many physicians and how many pharmacists would caution a patient getting anticoagulant therapy? If too much vitamin K is lost, a severe hemorrhage may cost the patient his life. A little thought can prevent such interference with metabolism of the body.

Important elements of the body are often tied up with the metabolism of certain drugs. Several years ago some patients who received isoniazid for

the treatment of tuberculosis developed peripheral neuritis. This neuritis was of such a severe degree as to incapacitate the patient completely and lead to paralysis and extremely severe pain of the peripheral nerves. It was found that a metabolite of isoniazid tied up with pyridoxine. The removal of pyridoxine, an essential vitamin, will lead to neuritis. We now give pyridoxine along with isoniazid and there is no neuritis.

Macrocytic anemia occurs in some people who receive large doses of diphenylhydantoin for long periods of time. This is an example of interference with folic acid metabolism and macrocytic anemia can occur. It is an unusual type of anemia and, until it was worked out and recognized as such, it was a real puzzle. We all know that physostigmine and neostigmine enhance the parasympathetic nervous system and cause diarrhea, flushing, extremely slow heart rate and in many patients collapse or even convulsions.

These reactions are well recognized. But is a closely related reaction well enough recognized? Here is an examination question I proposed several years ago. A young, healthy male of 22 comes into the hospital with fever, nausea, and vomiting, extreme pain in the lower right quadrant and an elevated white count. The physicians diagnose it as acute appendicitis. He is given 200-400 mg of pentobarbital and taken to the operating room where he is given 15 mg of morphine. He is then given ether. The operation reveals an acute appendix. Because the patient is not completely relaxed, the surgeon orders 20 mg of succinylcholine. The patient relaxes but he stops breathing. Now, what has gone wrong? Is this a so-called "idiosyncratic" reaction as it was considered for a long period of time? No, it is an iatrogenic-created situation. This patient happens to be one out of 2,800 humans who doesn't have a normal amount of pseudocholinesterase, the enzyme needed to destroy succinylcholine. The patient cannot metabolize the drug and only if he is kept alive by artificial means can he be saved.

We can't test everybody to see if he has low pseudocholinesterase in his serum before we give succinylcholine, but we must be much more cautious in administering the drug. People who are known to have reactions and have had trouble with such drugs should be watched.

We have drugs interfering with organ function. For example, if certain hallucinogenic drugs like LSD-25, or even plain, ordinary belladonna alkaloids are given, patients can go off into psychotic states so bizzare that the individual confuses time and space and appearances. Such confusion or state may last for hours and sometimes for days. Sometimes it can have profound effects on the personality of the patient after he recovers from the harrowing experiences.

We have drugs that interfere with cardiac rhythm. Antihistamines that are sold over the counter can produce tachycardia. Certain drugs that hit the vestibular nerve, such as streptomycin, can destroy the vestibular branch. Many drugs that hit the fifth nerve can cause parasthesias. We have peculiar reactions from neomycin which will cause shock under certain situations.

There are drug reactions affecting specific sites or tissues. For example, the eye can be affected by most of the anti-Parkinson drugs. Every

drug reaction table

drugs	1. Fixed eruptions	2. Erythema multiforme	3. Exfoliative dermatitis	4. Periarteritis nodosa	5. Serum sickness	6. Shock	7. Granulocytopenia	8. Hemolytic anemia	9. Thrombocytopenic purpura	10. Aplastic anemia	11. Hepatitis
Acetanilid	X										
Acetazolamide								X	X		
Aminopyrine							X		X		
Aminosalicyclic acid	X		X			X		X	X	X	
Anesthetics						X					
Antihistamines		X					X				
Antimony salts	X										
Antipyrine	X	X									
Arsenicals	X	X	X		X		X	X	X	X	
Aspirin						X					
Barbiturates	X	X	X		X		X				X
Belladonna			X								
Bromides		X									
Carbarsone			X								
Chloramphenicol		X					X	X	X	X	
Chlordiazepoxide							X			X	
Chlorothiazide									X	X	
Chlorpropamide									X	X	X
Cortilotropin					X	X					
Cortisone		X				X					
Dehydrocholic acid						X					
Diethylstilbestrol			X								
Digitalis					X						
Digitoxin								X			
Dinitrophenol			X								
Diphenhydramine						X					
Diphenylhydantoin							X	X			
Dipyrone							X				
Erythromycin estolate											X
Estradiol										X	
Estrogens								X			X
Folic Acid						X					
Gamma benzene hexachloride							X			X	
Gold salts	X	X	X				X	X	X	X	X
Heparin					X						
Hydantoins		X	X	X	X						X
Hydralazine					X					X	
Insulin					X						
Iodides	X		X	X	X	X					
Isoniazid					X		X				X
Liver extract					X						
Meperidine						X	X				
Mephenytoin							X			X	
Meprobamate							X	X			
Mercupurine											X
Mercurials	X		X	X	X	X				X	
Methantheline			X								
Methimazole							X				
Monoamine oxidase inhibitors											X
Naphthalene											
Nitrofurantoin											
Novobiocin											X
Opium alkaloids						X					
Penicillin	X	X	X		X	X	X	X	X	X	X
Phenacemide							X	X	X	X	X
Phenacetin	X	X									
Phenindione							X				X
Phenolphthalein	X	X									
Phenothiazines			X		X	X	X	X	X	X	X
Phenylbutazone		X	X		X		X		X	X	X
Pollen extracts						X					
Potassium perchlorate										X	
Procaine						X			X		
Procaine amide *							X				X
Quinacrine	X		X							X	X
Quinidine	X				X			X	X		
Quinine	X		X		X				X		
Ristocetin							X		X	X	
Salicylates	X	X			X		X				
Salicylazosulfapyridine								X			
Serums				X	X						
Streptomycin		X	X		X	X	X	X	X	X	X
Sulfadiazine						X					
Sulfadimethoxine										X	
Sulfamethoxypyridazine								X		X	
Sulfisoxazole										X	
Sulfobromophthalein						X					
Sulfocyanates					X						
Sulfonamides	X	X	X	X	X		X	X	X	X	X
Testosterone											X
Tetracycline	X	X			X		X	X		X	
Thiamine						X					
Thiazides	X		X								X
Thiosemicarbazone							X				
Thiouracils				X			X		X		
Thorium dioxide						X					
Tolbutamide							X		X	X	
Triacetyloleandomycin											X
Tripelennamine					X						
Vaccines		X			X						
Viomycin					X						

physician who is prescribing these—and pharmacists who are responsible for dispensing these prescriptions—must think about the possibility of glaucoma. Patients must be cautioned to see an ophthalmologist for care if there is the slightest indication of any difficulty. We are also using drugs like chloroquine which can produce subtle degeneration in the eye. Patients on long continued therapy must be checked by an ophthalmologist if serious harm to the eyes is to be avoided.

Most people, when they think of drug reactions, think in terms of allergy. Ten to 12 percent of all people are allergic to drugs of one kind or another. This is serious and we can expect to have iatrogenic disease occur in these patients when we have such a high incidence of drug allergy. It should be borne in mind, however, that a great number of reactions have nothing to do with allergy but are rather the manifestations of pharmacologic activity.

The table on page 8 presents a number of examples of hypersensitivity reactions to many different drugs. These include the following:

1. Fixed eruptions are localized eruptions in which a patch of skin will develop redness, itching, burning and dryness. Barbiturates, thiazide diuretics and phenolphthalein are among the common offenders.
2. Erythema multiforme is an acute, inflammatory skin disease characterized by reddish macules, usually on the neck, face, legs and dorsal surfaces of the hands, forearms and feet. Gastric distress and rheumatic pain may be initial symptoms. Drugs which may cause this condition include antihistamines, sulfonamides, and certain antibiotics.
3. Exfoliative dermatitis is one of the most serious types of drug reactions and can be incapacitating or even fatal. In this condition the epidermis is shed. The entire body may be involved in severe cases. Offenders include hydantoin derivatives, phenothiazines and phenylbutazone.
4. Periarteritis nodosa (or polyarteritis nodosa) is a rather rare disease involving a characteristic lesion and nodules and hemorrhage along the small arteries. It tends to attack the kidneys and may lead to kidney failure and death. Iodides, mercurials and thiouracils are examples of drugs which may produce this reaction.
5. Serum sickness is a delayed hypersensitivity reaction which is manifested by swollen, painful stiff joints and often fever for ten days or so after exposure to the drug. Offenders include hydralazine, serums and vaccines.
6. Some drugs, such as aspirin, anesthetics and sulfobromophthalein, may produce shock in which the patient suddenly collapses and may die within a very short time.
7. Many drugs have been implicated in the development of granulocytopenia (agranulocytosis), an acute febrile disease associated with a marked reduction in the number of granular leukocytes. Included are chloramphenicol, sulfonamides, phenylbutazone, phenindione, thiouracils and phenothiazines.
8. Several commonly used drugs are capable of producing hemolytic anemia, in which there is sudden destruction of huge amounts of blood leading to

jaundice, liver failure and severe anemia. Again, chloramphenicol is a villain. Nitrofurantoin, phenothiazines and sulfonamides are also major offenders.

9. Thrombocytopenic purpura is a condition characterized by hemorrhages in the skin and mucous membranes, associated with a decrease in the number of blood platelets. Quinidine, for example, may produce complete disappearance of thrombocytes and severe hemorrhage. Tolbutamide, sulfonamide and many other drugs may cause a similar reaction.
10. Aplastic anemia is a potentially fatal form of anemia resulting from defects of the bone marrow and marked by a deficiency of red cells, hemoglobin, and granular cells and by a predominance of lymphocytes. Potassium perchlorate, sometimes used in place of prophylthiouracil in the treatment of hyperthyroidism, is particularly dangerous in this respect and probably will be abandoned. Chloramphenicol is one of the leading causes of aplastic anemia. This drug should not be used carelessly, for long periods of time, or prophylactically. I never prescribe chloramphenicol unless there is an iron-clad reason for doing so.
11. A common iatrogenic disease is hepatitis. Among the leading offenders are the phenothiazines including chlorpromazine and promazine. Some of the newer drugs in this category appear to be less toxic to the liver. Other compounds known to be hepatotoxic include erythromycin estolate, monoamine oxidase inhibitors, thiazides and triocetyloleandomycin.

Drug reactions are creating a very serious problem. It is going to become worse and in both pharmacy and medicine we are committed deeply to do what we can to prevent and ameliorate the situation. How should we go about preventing drug reactions?

First, drugs should be used only when they are definitely essential. One should know why he is prescribing a drug and prescribe it for a definite purpose which can be defended from every possible angle if anything should go wrong. Self-medication can be dangerous, particularly when people can buy all kinds of agents at the supermarkets.

I am worried about the products sold in supermarkets. Individuals getting drugs there don't have the benefit of an expert pharmacist to point out what can go wrong when these products are taken or to advise people to see a physician if they have suspicious symptoms.

Even with simple drugs such as aspirin, dangerous reactions can occur. Aspirin is a safe drug when taken wisely and in proper doses but if it is abused, it may be toxic. Recently I have asked my patients about their intake of aspirin and aspirin-containing drugs. I am amazed at how many are taking large amounts of aspirin—10 to 12 tablets are not unusual for some patients—and they don't even look to see what the prescribed dosage on the bottle should be. They buy them in a food market and do not even consider them drugs.

We must select the least toxic agents. If a series of homologs shows the more potent ones have less toxicity than the older ones, we should shift to

the newer and less toxic agents as rapidly as possible. We should obtain the therapeutic effect we want and stop the drug promptly if we have gained what we desire from it. Patients should not be given large amounts of drugs to use as they please, to keep in the medicine cabinet, to use weeks or months after the original need has long since been relieved or to give to relatives or friends.

We should avoid multiple ingredient agents for the most part. It is very difficult to design multiple ingredient agents that are going to be specific to fit the dose to the person's needs at the particular time of illness. There are some that do it but most do not. We must have very careful observations of the patient on drugs. Any patient who is on almost any drug (see list in the drug reaction table) is subject to trouble and the physician must watch these patients. The pharmacist can also help by immediately warning the patient about possible harm and advising him to check with his physician if all is not going well.

Finally, all reactions should be reported–not only the reactions that occur in the hospital but those discovered in the physician's office. Every physician should report the reactions he sees to his hospital adverse drug reaction committee. This also applies to pharmacists. If somebody develops a skin reaction, it is the pharmacist's duty to see that he gets to the physician. Patients may get reactions and nobody sees them except the pharmacist. When reactions are reported, we can get a better picture of what is going on in this new field of medicine.

NOTE: Dr. Friend, Mr. Griffenhagen and his staff of the Journal of the American Pharmaceutical Association are congratulated for publishing this article–easily one of the most important contributions to medical literature in the past 25 years. It is strongly recommended that the drug reaction table be reproduced at all medical care facilities, and that MC, DC, MSC, and NC officers be alerted and encouraged to add their personal observations to the list–to keep it alive and current. For example, it is known that some drugs will cause a rather rapid development of erythema nodosum, as well as erythema multiforme. Also whole blood, fractions of blood, and plasma expanders are so much a part of today's therapeutic arsenal that special attention must be paid to their dangerous potential. Shortly, there will be distributed from BUMED to key treatment activities a monograph on transfusion problems. It bears the title General Principles of Blood Transfusion, and was prepared by the Subcommittee on Transfusion Problems, National Academy of Sciences, Division of Medical Sciences, National Research Council. It is published by J. B. Lippincott Company, Philadelphia Penna., and is priced at $1.50 for single copies - less if order is for 50 or more copies.

Lastly, I would like to give credit to CAPT Claude V. Timberlake, Jr., MSC USN of BUMED for his initiative and broad vision in focusing

our attention on the unusually great importance of Dr. Friend's article, and for his timely action in obtaining approval for its re-publication in the Medical News Letter.

—Editor

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Testicular Tumors

LT M. L. Cowen MC USN* and LCDR R. I. Morgan MC USN**. Proceedings of the Monthly Staff Conferences of the U. S. Naval Hospital, NNMC, Bethesda, Md., 1963-1964.

Testicular tumors in the files of the Pathology Branch, Laboratory Department, were reviewed. One hundred and ninety-three cases were indexed. Pathological material, slides or blocks, was available in 155 of these. Information on follow-up of two or more years was obtained on 83 cases.

Fourteen cases of non-germinal tumors of testis were available for study. These included four patients with adenomatoid tumors, all of whom were alive two or more years after orchiectomy. Four patients had carcinomas metastatic to testis. These four were dead within two years. One patient with lymphosarcoma presented first with testicular infiltration by this tumor and died of his disease within three years. One patient had an adenocarcinoma of the rete testis and he was alive and well ten years after orchiectomy, retroperitoneal lymphadenectomy, and irradiation. The only Negro patient in the entire series had a liposarcoma involving the testis but extending into the retroperitoneal space.

Two-year follow-up and pathological material were obtained on 69 patients with germinal tumors. The four elements of germinal tumors, (1) seminoma, (2) embryonal carcinoma, (3) teratoma, and (4) choriocarcinoma, may occur in all combinations. It is apparent that a classification including all of these as separate entities would be unwieldy and of little value. Dixon and Moore have divided these into five groups on the basis of prognosis. Their classification is based on two postulates: (1) Though pure seminoma has a relatively good prognosis, when seminoma occurs in combination with one of the other germinal cell species, the prognosis of the patient is similar to that of a patient with a tumor of the other germinal species with seminoma; (2) The prognosis of patients with teratoma plus embryonal or choriocarcinoma is better than that of patients with embryonal or choriocarcinoma without teratoma. The following two tables show the two-year (or more) survival rates: (1) in Pure Embryonal Carcinoma compared to Embryonal Carcinoma combined

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with Seminoma, and (2) in Embryonal Carcinoma (with or without seminoma) compared to Embryonal Carcinoma combined with Teratoma.

Table I (Survivals)

Pure Embryonal Carcinoma..... 4 of 13 (31%)
Embryonal Carcinoma with Seminoma..... 3 of 6 (50%)

Table II (Survivals)

Embryonal Carcinoma without Teratoma .... 7 of 19 (37%)
Embryonal Carcinoma with Teratoma..... 4 of 6 (67%)

These results appear to agree with the postulates and the authors have therefore used the classification based upon them. The incidence and survival data are summarized in Table III:

Table III

Classification	Incidence	Survival
1. Pure Seminoma	29 (42%)	23-29 (80%)
2. Embryonal with or without Seminoma	19 (28%)	7-19 (37%)
3. Teratoma with or without Seminoma	9 (13%)	4-9 (45%)
4. Teratoma with Embryonal or Choriocarcinoma	8 (12%)	6-8 (75%)
5. Choriocarcinoma without Teratoma	4 (5%)	0-4 (0%)
Total with follow-up	69	40-69 (58%)

The effect of retroperitoneal node dissection (in addition to orchiectomy and irradiation) in Embryonal Carcinoma is summarized in the next table.

Table IV (Survivals)

Embryonal with node dissection.....3 of 6 alive
Embryonal without node dissection .....4 of 13 alive

This appears to indicate that node dissection is of value, but a prospective study is necessary to evaluate this therapeutic measure.

Pathologic material and follow-up data were obtained on 83 cases of testicular tumor. The basis of classification was discussed and a summary of the incidence and survival of patients with these tumors was presented.

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Surgical Operations on the Unborn Fetus May Presage New Era for Immunology Research

Washington, D. C., June 18, 1964 (AFIP). Clues to solving problems of transplanting human organs may lie in a dramatically radical series of experiments currently being conducted by a research team at the Armed Forces Institute of Pathology. Their program has been underway for the past five years. The methodology, which involves operations on ovine fetuses (unborn lambs) outside the anesthetized mother's uterus, may shed light on how the adult develops immunity to infectious diseases and how transplanted organs from one human to another are rejected by the recipient. The studies are being conducted by Dr. A. M. Silverstein, a civilian immunologist, and CAPT K. L. Kraner, an Air Force veterinarian, for the Army Medical Research and Development Command.

Basically, the procedure involves completely removing the tiny fetus from the mother's uterus, leaving it attached only by the umbilical cord. While out of the uterus, the fetus can be immunized, grafted with tissues from another animal, or have its thymus removed. (The thymus is considered to play a major role in development of immunity in the animal). The fetus is then replaced into the mother's uterus, and at a later date is again removed to allow the doctors to study the response of the fetus to antigenic stimulus—what it will respond to, when it will respond and to what type of stimulus. The researchers are now beginning similar operations on fetal monkeys whose characteristics more closely resemble man's. This is expected to provide considerable new information on the development of immunity to disease and the body's ability to accept foreign tissue.

The values of the program are at least three-fold in that they: are expanding the basic knowledge of the body's responses to immunization which could lead to improved immunization processes; might provide better approaches to immunization of the newborn to afford more protection against infectious diseases to newborn babies; may give clues to the solutions of some of the problems in skin and organ transplantation which has obvious potential application in military surgery.

Perhaps the most startling result of the experiment is that the operations do not interfere with pregnancy and do not impede the development of the fetus. "The amazing thing is that we can do this (remove the fetus from the uterus) virtually with impunity," Dr. Kraner said. "Initially, we doubted the fetuses would survive, but they do. We have performed almost 100 operations of this type, many of them repeated on the same fetus, with very few failures. The development of these animals apparently has not been impaired." Dr. Kraner added that with the umbilical cord intact, the fetus is much hardier than suspected. In many cases, the undisturbed twin offers a ready comparison in development. Contrary to the earlier belief that an animal cannot develop immunity before birth, these studies have shown that the fetal lamb can form protective antibodies very early in gestation; its ability to respond to others does not develop until some time after birth.

The fetal lamb is not the only developing animal that can produce an immunity in utero. An AFIP study of aborted fetuses has shown that when the human fetus develops congenital infectious diseases such as syphilis or toxoplasmosis as a result of maternal infection, it also attempts to protect itself by an immune response. Drs. Silverstein and Kraner express the hope that clarification of these processes in the fetus may provide clues for improving immunization procedures in newborns.

Another major finding is that immunity to disease is not the only function possible in the fetus. The fetus can also reject grafts of tissues and organs. The scientists have proven that the fetal lamb can reject skin grafts any time after the middle of the gestation period. The study of how the fetus rejects a graft in its special intrauterine environment has already clarified some of the basic mechanisms involved in the immunologic rejection of foreign tissue.

Techniques for transplanting organs from one human to another have been receiving a growing amount of attention both from the medical profession and the public in the past few years. This interest, at least on the part of the public, has been whetted by occasional and widely publicized successes in kidney transplants. These transplants, however, have involved the use of immune-suppressive drugs which not only lower the body's natural tendency to resist foreign tissue but also its resistance to other foreign substances such as a cold virus. There have been equally well-publicized failures. Ideally, transplants would be possible without the use of those drugs which lower the body's resistance to various diseases. Doctors Kraner and Silverstein are trying to find out if and how that would be possible.

—Adapted from Information Activities Office News Release, Walter Reed Army Medical Center.

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FROM THE NOTE BOOK

Medical Department Orientation Course

The Medical Department Correspondence Course "Medical Department Orientation" NavPers 10943-A-1, is now ready for distribution to eligible regular and reserve officer and enlisted personnel of the Armed Forces. Applications for this course should be submitted on Form NavPers 992 (with the appropriate change in the "To" line), and forwarded via appropriate official channels to the Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014.

This correspondence course is intended for both officer and enlisted personnel of the Navy Medical Department. It covers the historical background of the Medical Department, the Bureau of Medicine and Surgery, facilities of the Medical Department ashore, naval medical centers, medical and

dental facilities afloat, the naval hospital in naval hospital ships, medical and dental facilities in advanced bases, medical and dental support of the U. S. Marine Corps, and the training program of the Medical Department.

The course is composed of three (3) objective-type assignments and is evaluated at five (5) Naval Reserve promotion and/or non-disability retirement points. These points are creditable only to personnel eligible to receive them under current directives governing retirement and/or promotion of Reserve personnel. This is a minor revision and personnel who completed NavPers 10943-A will NOT receive additional credit for completing this revision.

—Submitted by CAPT J. H. Stover, Jr., Commanding Officer, U. S. Naval Medical School, NNMC, Bethesda, Md.

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U. S. Naval Medical Research Institute, NNMC, Bethesda, Md.

1. Thermal Protection During Immersion in Cold Water: MR 005. 13-4001. 06 Report No. 1, March 1964.
2. Chemical Mechanisms in Oxygen Toxicity: MR 005. 14-3001. 02 Report No. 4, March 1964.

U. S. Naval Medical Field Research Laboratory, Camp Lejeune, N. C.

1. The Prediction of Rifle Marksmanship by Performance Tests: MR 005. 01-0030 Subtask 2 Report No. 2, May 1964.
2. Antibodies to Mouse Hepatitis Viruses in Human Sera: MR 005. 09-1204 Subtask 4 Report No. 14, May 1964.

U. S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Penna.

1. A Generalized Theory of Particulate Electron Conduction Enzymes Applied to Cytochrome Oxidase. A Theory of Coupled Electron and/or Ion Transport Applied to Pyruvate Carboxylase: MR 005. 13-0002. 7 Report No. 25, April 1964.

U. S. Naval Medical Research Laboratory, U. S. Naval Submarine Base, New London, Conn.

1. Human Factors and the Work Environment. II. The Impact of Isolation upon Personnel: MR 005. 14-2100. 03. 07 Report No. 358, July 1961.
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3. Prediction of Adjustment to Prolonged Submergence Aboard a Fleet Ballistic Missile Submarine. II. Background Variables: MR 005. 14-2200-1. 04 Report No. 384, July 1962.

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MISCELLANY

Advanced Notice of Revised Procedures Concerning Examination of Candidates for Service Academies

By CAPT Herbert H. Eighmy* MC USN - Senior Medical Officer, Severn River Naval Command

1. Candidates for the Armed Forces Service Academies are a very special group in many respects, not the least of which is their physical aspect. Every Armed Forces Medical officer is in a position to do his country a great service or a grave disservice each time he examines and reports upon the physical findings of any candidate. It is absolutely essential that successful candidates for admission conform to the well established rules and regulations concerning physical findings at the time of admission if we expect or hope that the product available at the end of four years can measure up to standards for commission and thus a reasonable aspect of serving as an officer for several years thereafter.
2. Recently the House Armed Services Committee directed that the Department of Defense unify the admission standards (academic, physical aptitude, and medical) for all the service academies, insofar as possible. In this regard, much attention has been leveled on the concept that since the academies are sponsored by the federal government the candidates should be interchangeable and all subject to the same physical standards, and yet there are different demands and limitations on the graduates from each institution. Tri-service committees were formed to make recommendations for a single examination that would satisfy the requirements of all the service academies. It was agreed that:

   a. The standard forms now used by the Armed Services (SFs 88, 89, 603 and 513, if applicable would suffice for the reports.
   b. Reports of medical examination from any or all services would be honored by sister services, subject to final approval by the service concerned.
   c. A single qualifying (formal) medical examination conducted after 1 July each year to a closing date (not yet determined) would suffice for any one year.

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* Captain Eighmy was promoted to the rank of Rear Admiral on July 1, 1964.

d. Each service will furnish to the other academies copies of reports of qualifying examinations conducted.
e. Preliminary physical examinations should be discontinued and replaced by qualifying examination as in (c).
f. Examinations will be conducted by a flight surgeon or aviation medical examiner in all cases where such examiners are available. At hospitals not having a flight surgeon or aviation medical examiner, it is considered that an appropriate determination regarding aeronautical adaptability will be accomplished by a qualified psychiatrist.
g. The qualifying examination will be accomplished only at Army, Navy, and Air Force Hospitals and certain designated examining facilities.
h. Color tests should be reported by testing with both FaLant and pseudo-isochromatic test plates for all candidates.
i. ECG required on all candidates.
j. Audiometry on all candidates.
k. Muscle balance, depth perception test, near point of accommodation, red lens test, and cycloplegic refraction required on all candidates.
l. Personal History Booklet essential and psychological interview required by all services.
m. Physical aptitude test must be completed and successfully passed by all candidates. Although the Army and Air Force require more tests than the standard Navy tests, the Navy will adhere to its tests for all candidates until procedures are established at the Navy examining facilities to conduct the PAT examinations required for the other service academies.
n. All findings should be accurately reported and the reviewing officer should indicate which service(s) the report should be forwarded to, without indicating whether or not the candidate is qualified, waiverable, or any other decision.

3. Special items:

a. Vision should be recorded and if less than 20/20 O. U., the lens indicated necessary to fully correct to 20/20.
b. Pilonidal cysts and sinuses should be fully described as to openings, pores, sinuses, discharge, induration, size and whether ever inflamed or operated upon.
c. Blood pressure taken in the sitting position should be recorded and the maximum persistent range should not be above 130/84.
d. EPTE items such as diabetes, asthma, hay fever, enuresis, major injury, operations or illnesses and periods of unconsciousness should be fully described and documented.
e. Personal History Booklet should be reviewed and comments made on its last page by the interviewer.
f. Reading aloud test should be documented and a note made of lisps, stuttering or stammering if it obtains.

4. This trial and transition period is being conducted because all of the service academy medical authorities are making a special effort to conform to the idea of a single sufficient physical examination satisfactory to all hands, and all hands in the Navy are requested to give it a good serious effort to suceed. To this end, Commanding Officers of all examining centers are enjoined to appoint a single officer to become intimately acquainted with the requirements of the qualifying medical examination for the Naval Academy and the other items as listed previously and to assure that each candidate for any service academy is properly and completely examined and accurately reported on the standard forms. If consultation(s) is held, the report should be appended to all copies of the final report. Opinions are welcome and necessary many times for final board action at the Naval Academy, Air Force Academy and Military Academy levels. No commitment or opinion should be made to any candidate as to whether or not he qualifies for any academy.
5. It goes without saying that adequate secretarial help is necessary by record office personnel familiar with the forms used and that the results of the examination should be accurately and completely recorded and forwarded promptly to the proper board at the Naval Academy, the Air Force Academy or, in the case of Military Academy applicants, to the Surgeon General (Army), Washington, D. C. It is mandatory that an officer personally check every item of every form submitted in each case processed while the applicant is present. The word "waiverable" has taken on a connotation that the condition is acceptable; this is not true unless the candidate has many other virtues to offset the defect which would also have to be minor.
6. Existing regulations concerning the examination and processing of candidates for enrollment into the various service academies have been revised and are currently being cleared within the Department of Defense. Early promulgation is anticipated.

Federal Hospital Luncheon - An Announcement

The Federal Hospital Executives Luncheon, sponsored this year by the U. S. Public Health Service, will be held on Tuesday, 25 August 1964 at 12 noon, at McCormick Place, Chicago, Illinois. Doctor Frank B. Berry, Former Assistant Secretary of Defense (Health & Medical) will be the guest speaker.

The Committee on Federal Medical Services of the American Hospital Association arranges for the annual Federal Hospital Executives Luncheon and coordinates a Federal Hospital Exhibit at the Annual Meeting of the Association. The Committee is composed of representatives of the Army, Navy, Air Force, Public Health Service, Veterans Administration, and the Bureau of the Budget. The Committee advises the Council on Government Relations, and acts to enhance coordination between Federal Services hospitals and the civilian hospitals throughout the country.

The price of the tickets for the luncheon is $5.00 per person. They may be obtained from CDR D. D. Moore MSC USN, Code 31A, Ext. 61834, Bureau of Medicine and Surgery, Navy Department, Washington, D. C. 20390. Checks or money orders should be made payable to the American Hospital Association. It is requested that tickets be purchased prior to 15 August 1964. —Submitted by CAPT John E. Gorman MC USN, Director of the Professional Division, BUMED.

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It Can Happen Here*

Reprinted by permission of The Honorable Durward G. Hall MD, Representative from Missouri (7th District). From the Congressional Record 110(115): 12578, June 9, 1964.

(Mr. Hall asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. Hall. Mr. Speaker, as one of the physicians and surgeons in the Congress I feel the typhoid epidemic in Aberdeen, Scotland, must serve as a warning that "it can happen here," at any time and at any place unless we exercise continued vigilance against typhoid and the other ancient scourges of mankind. In this day of "miracle drugs" and widespread inoculations we are in danger of becoming complacent, of feeling that the battle has been won against these diseases. But plague, smallpox, typhoid, and yellow fever have not been conquered. They are rampant in less developed nations, and only dormant in the civilized world. Only constant battle can keep them from erupting again in the Western World.

In recent years, we have seen outbreaks of typhoid in Zermatt, Switzerland, and in Aberdeen, epidemics of infectious hepatitis in this country, smallpox scares set off by infected travelers returning from abroad. The killing of millions of fish in our waterways from water contamination apparently by pesticides or industrial wastes has been in the headlines.

As a physician who has lived through some epidemics in this country and who has treated many victims, I can assure you they are very real dangers and that I have never felt in the least complacent about them. Indeed, my first experience on entering practice in Springfield, Mo., in 1936 was with scores of typhoid patients who had contacted the disease from contaminated lake, mains and well-water which had sunk to a very low level due to the great drought of the time. Two years before as an intern I helped treat victims of the amoebic dysentery epidemic in Chicago. And in New York City in 1947 I saw at first hand the mobilization of health resources in a smallpox scare. Now all of England is endangered by a typhoid epidemic, and we can take no comfort in the ocean that separates us. The disease can travel as far and as fast as a jet aircraft. This episode in Scotland must awaken us to the potential hazards of the health scourges such as typhoid, and every step must be taken now and in the future to minimize the peril. There is at this time no known feasible way

in which these highly contagious diseases—most stemming from filth and contamination—can be wiped out once and for all in all countries.

Typhoid germs are transmitted in impure water supplies, sewage and unpasteurized milk. In the past, most typhoid epidemics were caused in the United States by sewage contamination of water and milk supplies. More recently, the disease usually has been traced to a single carrier, often a food handler. Contaminated sewage leaking into the water supply caused the Swiss epidemic. Apparently a contaminated food handler touched off the Scot epidemic, or from outside contamination of tins of imported beef—washed in river water draining a military camp with known typhoid cases.

Inoculation with killed typhoid vaccines is of value, especially for travelers abroad and for military groups, but it is not foolproof. As the Public Health Service states, immunization is no substitute for personal hygiene and sanitation. But the broad attack must be on keeping our water supplies unpolluted, and our sewage systems effective. The Senate this year has passed legislation that would step up the national effort against polluted waterways. This bill is now before the Public Works Committee, and I recommend its eventual adoption by the House with one reservation. A provision taking control activities away from the U. S. Public Health Service should be dropped. The agency most concerned with environmental health hazards on human health should continue to be the responsible Federal authority in this field. The human health aspect of water pollution cannot be deemphasized.

I have no intention of being an alarmist in this matter. Plague, smallpox, typhoid, and yellow fever have declined almost to the point of extinction in this Nation. As a result, there has been an understandable tendency by health workers to turn their attention to what seemed to be more pressing matters. The Scottish typhoid episode should serve as a red flag to us. Now, is the time to look again at what we are doing to hold back these ancient diseases that still cause countless deaths in other parts of the world.

One highly commendatory activity now being carried on by the Public Health Service is its program to eradicate the yellow fever mosquito in the South. Ironically, at the urging of the United States and international health agencies, most South and Central American nations have eliminated the mosquito aedes aegypti in areas where it could transmit the disease. They have the human carriers but not the mosquito transmitter. We have the mosquito, but not the carriers.

Safety controls over public water supplies, rat control to guard against a recurrence of the plague, vaccination against smallpox, including regular booster shots for adults, and eradication of the yellow fever mosquito are the weapons we have and must continually use to keep these old dangers to mankind at bay.

We must remember, "it can happen here."

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* The editor expresses his appreciation to Dr. Hall for permitting the publication of his speech in the U. S. Navy Medical News Letter.

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DENTAL SECTION

Appraisal of the Hazards of Dental Radiation

Robert B. Sloane D D S, N Y State Dental J. Vol 30, March 1964.

With the great wave of concern about the hazards of excessive radiation at a cyclic ebb, perhaps we can evaluate its effect on dental radiographic techniques.

For a dental radiograph to be of value as a diagnostic aid, it should have the following minimum qualities:

1. A discernible difference between the teeth and their supporting structures.
2. A discernible difference between the enamel, dentin, and carious lesions.
3. A discernible periodontal membrane, if it is not pathologically absent.

The author believes that the excessive concern for the protection of the patient has resulted in the too general acceptance of techniques that produce radiographs of poor diagnostic quality. If the radiograph is not of diagnostic value, the patient has been subjected to radiation unnecessarily.

Three areas that may be affected by exposure to dental radiation are:

1. The tissue directly exposed to the primary beam.
2. The body in general.
3. The gonads.

It has been stated[1, 2] that the local effect on tissue exposed to a properly coned and filtered beam is so minimal that for all practical purposes it can be disregarded. Normal cells have a high recovery rate from reasonable exposure to dental x-rays and therefore the transient effect of radiation on the oral tissues is negligible.

The general body effects of dental radiation are evaluated basically in their effect on the hemopoietic and endocrine systems. It is generally accepted that both of these systems can be affected by large prolonged doses of radiation. A dental patient, however, can be appropriately shielded from the insignificant accumulative effects of small, infrequent, and controlled exposures.

As for the gonadal effect, Culver states,[2] "In dental x-ray per exposure, gonadal structures in the male receive .34 milliroentgens and in the female .06 milliroentgens. These figures are minute and transposing them to dosages that would be effective for genetic changes, we can arrive at the following figures. In the male, it would take approximately 30,000 exposures and in the female, 167,000 exposures."

The Jouranl of the American Medical Association[3] substantiates Culver's statement in an editorial answer to one of its member's questions in the October 1957 issue.

Richards[4] arrived at similar conclusions as to the effect of dental x-ray on the gonads.

Even this minimal hazard can be eliminated by covering the patient, from shoulder to knee, with a lead rubber apron having a .5 mm lead equivalent.

It appears that the much feared gonadal effect of dental x-ray has been overstated. Therefore, reducing the exposure time by increasing the kilovoltage and milliamperage and accepting films of poor diagnostic value seems to be protection of questionable value.

As a matter of actual fact, though the exposure time is decreased when the milliamperage is appropriately increased, the patient still receives the same total amount of radiation. The milliamps per second will be the same. Raising the kilovoltage decreases the exposure time and changes the character of the primary beam. The higher the kilovoltage, the shorter the wave length of the primary beam. The shorter the wave length, the greater the penetrability and the scatter radiation produced. The lower the kilovoltage, the higher the film contrast and the greater the tissue differentiation made possible. It has been suggested that the kilovoltage selected should be no higher than necessary for adequate tissue penetration.

When dental x-rays are taken, the operator, as well as the patient, should be protected. The operator should either maintain an adequate distance between himself and the line of the primary beam, or stand behind a 1.5 mm lead shield. The patient can be protected by the use of an appropriate diaphragm to reduce the diameter of the primary beam; by the introduction of adequate filtration; and by a shoulder to knee lead-rubber drape.

The dental film manufacturers can contribute to the reduction in x-ray exposure by producing films whose greater speed and inherent response to x-ray energy is engineered to provide the contrast necessary for proper tissue differentiation.

It would seem that we, as a profession, have unwittingly adopted techniques that mirror the general concern about x-ray exposure and accepted radiographs of less than diagnostic value. We have been so concerned with sparing our patients unnecessary x-ray exposure that we have accepted standards for our diagnostic films that do not meet the basic requirements suggested in this paper.

Like the fable of "The Emperor's Clothes" we have seen nothing but the long gray cloth.

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2. Culver, Gordon J.: Radiation Effects, Hazards, and Protection as Related to Dentistry, N. Y. State D J 23: 189-196 May 1957.
3. J A M A October 1957. Reprinted in J A D A 55: 722 Nov 1957.
4. Ibid. Cit.

Effects of Complete Dentures on Facial Esthetics

Alexander L. Martone D D S, M Sc, Norfolk, Va. J Pros Dentistry 14(2): 231-255, March - April 1964.

Prosthodontists deal with a balance sheet primarily composed of losses—loss of teeth, alveolar processes, tonicity of musculature, elasticity of skin, as well as loss or impairment of functions. Because of this, it has been suggested that the beginning of prosthodontic treatment should be an evaluation of the total loss incurred by the patient.

The loss of oral structures primarily affects the appearance of the lower part of the face, but the restoration must be in esthetic accord with the upper part of the face if the harmony of the entire face is to be achieved. Thus, the entire face and that face in function establish the criteria for the living esthetics. It is this total esthetic result which must be of concern to the dentist.

The degrees and variations of the edentulous appearance are influenced by the patient's age, sex, race, general health, inherited characteristics, length of time the teeth have been out and the ratio of rate of tissue changes in the regions of the lips and cheeks in comparison to the rate of change in other regions. If oral support is lost at middle age or in old age, after normal growth and development have occurred, and after normal neuromuscular patterns have been established, facial contours usually change at a slower rate. Normal degenerative processes, such as the loss of elasticity of skin, reduction of size of fat cells, and loss of elasticity or decrease of connective tissues, are decelerated, and impairment of function produces less drastic results because there is no interference with normal growth and development.

We are in need of more objective means of analyzing the role natural teeth and supporting structures play in providing the correct amount of support for musculature in function, and determining for the individual patient the degree and kind of artificial support which must be supplied to permit the musculature to continue to function efficiently.

The loss of teeth and their supporting structures produces radical changes in facial appearance. Successful efforts to restore the appearance of the face with complete dentures are dependent upon the knowledges of the anatomy of esthetics, and the esthetics of anatomy. The former constitutes a respect for the integrity of anatomic demands, whereas the latter is an appreciation of the beauty of anatomy as it fulfills these demands.

In the article the author relates his observations of the effects of tooth position and denture base contour to the anatomy and physiology of the facial structures and tissues and suggests techniques for the further study of facial contour.

(Submitted by CAPT M. L. Parker D C USN, U. S. Naval Dental Clinic, Pearl Harbor, Hawaii)

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Hemangiomas of the Mandible and Maxilla

Bruce A. Lund D D S and David C. Dahlin M D, Mayo Clinic, Rochester, Minn. Jour of Oral Surgery Anesthesia and Hospital Dental Service 22 (3): 234-242 May 1964.

Hemangiomas, although rarely reported as involving the mandible and maxilla, probably occur much more frequently than indicated by surveys of the literature. The unsuspected existence of an intraosseous hemangioma can result in life endangering postoperative emergency. The simple extraction of a tooth having this vascular tumor involving the periapical area is capable of producing a spontaneous hemorrhage which is extremely difficult to arrest.

The authors found in their detailed report of 4 cases and a survey of 35 other cases seen at Mayo clinic that the peak incidence was in the second decade of life, although the lesion may be found in any age group. In three of the 35 cases reviewed the lesions were fatal. Two thirds of the lesions occurred in the mandible. Clinically the tumor tends to produce a hard, non-tender swelling with a history of having slowly increased in size over a period of months or years. Pain is not a constant finding although alteration of nerve sensation has been reported. Radiographically, hemangiomas of the mandible or maxilla may present a "sunray" appearance with numerous trabeculae radiating in all directions within an expansile radiolucent area. A more common finding, however, is the "soap bubble" effect produced by multiloculation and resembling the radiographic appearance of a giant cell tumor. In other cases ill-defined areas of radiolucency have been reported.

Histologically the tumor may be of the cavernous or capillary type with variations in degree of cystic formation and ossification. These tumors although benign, have the potential for rapid increase in size becoming locally destructive and invasive. Resection, curettage and radiotherapy have been used successfully in the treatment of these lesions, with the proper surgical precautions for controlling hemorrhage. The possibility of the existence of this lesion should be considered in making a preoperative diagnosis of any large periapical radiolucency.

(Submitted by CAPT P. J. Boyne D C USN USS Bon Homme Richard CVA-31)

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Numbness in Chin may Point to Carcinoma

Numbness of the chin and lower lip may indicate possible malignancy, two dentists reported.

In an abstract of an article, in Dental Abstracts, Drs. John R. Calverley and Alex M. Mohnac, Lackland AFB, Texas, described clinical findings in five patients with metastatic carcinoma.

In all five cases, a "metastatic malignant lesion in the lower jaw produced the numbness." The primary site in three cases was traced to breast carcinoma and in a fourth case to Hodgkin's granuloma. In the fifth case, the malignancy had metastasized throughout the body.

In one of the five cases, numbness of the chin was the first sign of malignancy.

"Of the five patients, none had swelling in the involved region, and only two complained of pain in the jaw. All, however, had altered sensation in the distribution of the inferior alveolar nerve," they explained.

The altered sensations ranged from spotty prickling sensations in the jaw to numbness of the entire chin, they stated.

Drs. Calverley and Mohnac are stationed at the U. S. Air Force Hospital at Lackland AFB.

Problem of Broken Appointments

The problem of broken appointments, with the resultant loss of valuable professional time and perhaps an increased waiting time for others seeking appointments, is discussed with senior dental officers by the Inspector General, Dental, during his surveys throughout the world. Apparently, the solution is one of education. That is, pointing out to others during Department Head meetings the importance of keeping dental appointments and, at the time of appointment, to remind the individual of his obligation to keep his appointment or notify the clinic. If appointments are needlessly broken or cancelled too late to properly utilize the time, a dental appointment failure notification similar to the one described below may be utilized.

DENTAL DEPARTMENT

TO: *1. Retain in files 6 months.*

NAME	RANK/RATE	FILE/SERVICE NO.	SCHEDULED DENTAL APPOINTMENT *(Date & time)*

1. This person failed to keep a scheduled dental appointment.

2. It is requested that necessary action be taken to ensure that dental appointments are kept. Notify this office by endorsement below of action taken.

DATE	SIGNED *(Dental Officer)*

FIRST ENDORSEMENT

TO	FROM
Dental Officer	

ACTION TAKEN

DATE	SIGNED

Personnel and Professional Notes

11ND Annual Dental Meeting Honors Local Dental Society. The annual Professional Military Symposium sponsored by dental officers of the 11ND honoring members of the San Diego County Dental Society was held on 15 June 1964, at USNTC, San Diego, California. The following table clinics were presented:

Immediate Occlusal Stent
CAPT A. L. Wallace, DC USN
and LT V. R. Mancuso, DC USNR
NDC Camp Pendleton, California

Cardio-Pulmonary Resuscitation
CDR W. J. Jasper, DC USN
USNTC San Diego, California

Minor Tooth Movement for the
General Practitioner
LT D. L. Turpin DC USNR
AmPhiBase Coronado, California

Powdered Gold
David Kaylor, Student
School of Dentistry
Loma Linda University

Silicone Investment Technique
for Prosthetic Dentistry
James Nethery, Student
School of Dentistry
Loma Linda University

Highlight of the meeting was a presentation by Melvin R. Lund, DMD, MS, School of Dentistry, Loma Linda University, entitled, "A New Refractory Material - Its Revolutionary Effect Upon a Casting Process." This material is utilized as a die which is handled in a normal manner as it pertains to the wax manipulation. It does not use water as a mixing medium but a liquid which is supplied. When wax fabrication is complete, the total unit pattern and die is invested with the gold being cast direct to the die. The results give, what is felt are, prime advantages in that the margins and fit of the resulting castings appear consistently better related, as finished restorations, when compared to the normal technics. This material has been used to produce single castings in excess of a thousand and also many fixed partials, without any solder joints.

12th Annual Tri-service Meeting Held at Camp Zama, Japan. The 12th Annual Spring Meeting of the American Stomatological Society of Japan was held 6-8 May 1964, at Camp Zama, Japan. The membership, comprised of Tri-service dentists stationed in Japan, hosted 129 Army, Navy, and Air Force dental officers from installations in Japan, Okinawa, Korea, and the Philippine Islands, as well as 48 Japanese dentists.

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OCCUPATIONAL MEDICINE

Effects of Mild Carbon Monoxide Intoxication

CDR John H. Schulte MC USN,* Archives of Environmental Health, 7: 524 - 530, Nov 1963.

Carbon monoxide has been a toxicological problem to man throughout his history. The problem began when man encountered his first fire and has continued to increase in significance to the present time. Carbon monoxide is currently the most important gaseous poison which confronts physicians. It causes more deaths than all other toxic gases combined.

Many studies have been undertaken to determine the earliest changes that occur in human subjects exposed to an atmosphere containing carbon monoxide. To accomplish this objective, most investigators have attempted to relate the level of carbon monoxide in the blood to the onset of subjective symptoms or to alterations in physiological functions.

The correlation of subjective symptoms with the level of carboxyhemoglobin is extremely difficult to evaluate, however. The degree of somatic consciousness, responsiveness to suggestion, preconceived ideas and ulterior motives of the subject may all play an important part in determining the time of onset and the intensity of the symptoms. Furthermore, many authors[2, 6, 11, 12, 14, 16, 17, 19, 20, 23] have found that the symptoms which occur in subjects with levels of carboxyhemoglobin below 20 per cent are vague and nondescript, and include such subjective complaints as mild frontal headache, vague generalized weakness, fatigue, lassitude and drowsiness. These symptoms become progressively more severe when the concentration of carbon monoxide in the blood increases beyond 25 per cent; and under these circumstances it is reasonably certain that the symptoms which develop are attributable to carbon monoxide.

Since alterations in physiological activities are influenced to a much lesser degree by somatic awareness, suggestibility and preconceptions, the correlation of measurable changes in physiological functions to the concentration of carboxyhemoglobin is more reliable and accurate than the correlation of subjective symptoms to the level of carboxyhemoglobin. Alterations in physiological functions are not usually found at levels of carboxyhemoglobin below 20 per cent, however. Asmussen and Knudson[2], Haggard[9], and others[7, 11] could not find any change in the resting pulse rate, cardiac output

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or blood pressure until the carboxyhemoglobin in their subjects increased to a concentration of 20 to 30 per cent. Haldane[11, 12] did not find an increase in respiratory ventilation until more than 30 per cent of the hemoglobin in the blood of his subjects had combined with carbon monoxide. Vollmer, et al.[26] could not elicit any measurable disturbances in the visual fields in subjects whose blood contained less than 25 per cent carboxyhemoglobin. Table I illustrates the correlations found in these studies between the onset of subjective symptoms or changes in physiological activities, and the level of carboxyhemoglobin.

Table I

Signs and Symptoms at Various Concentrations of Carboxyhemoglobin

% COHb	Signs and Symptoms
0-10	No signs or symptoms.
10-20	Tightness across the forehead, possible slight headache, dilation of the cutaneous blood vessels.
20-30	Headache and throbbing in the temples.
30-40	Severe headache, weakness, dizziness, dimness of vision, nausea, vomiting and collapse.
40-50	Same as above, greater possibility of collapse, syncope and increased pulse and respiratory rates.
50-60	Syncope, increased respiratory and pulse rates, coma, intermittent convulsions, and Cheyne-Stokes respiration.
60-70	Coma, intermittent convulsions, depressed heart action and respiratory rate, and possible death.
70-80	Weak pulse, slow respirations, respiratory failure and death within a few hours.
80-90	Death in less than an hour.
90+	Death within a few minutes.

The investigations of the Haldanes[4, 10, 11, 12, 13], and others have shown that the presence of carbon monoxide in the blood markedly reduces its capacity for carrying oxygen. It has been demonstrated further[1, 3, 5, 22] that the

functions of the higher centers in the central nervous system are more sensitive to a decrease in the level of oxygen in the blood than are the functions of other body tissues, including the lower nervous system centers in the pons, cerebellum medulla and spinal cord. It can be anticipated, therefore, that the higher nerve centers may be more sensitive to the amount of carbon monoxide in the blood than are the other body tissues, including the lower nervous system centers.

Impairment in the functions of the higher nerve centers is frequently determined by measuring the degree and type of alteration which can be demonstrated in psychological abilities. Fleishman[8] has divided all psychological skills or abilities into three large categories—perceptual, psychomotor, and cognitive. Each of these categories can be further subdivided into specific functions or abilities which are independent of each other. The psychomotor skills, for example, have been subdivided into fifteen distinctly different functions including such attributes as control precision, multiple limb coordination, choice discrimination, reaction time, etc.

The effects of carbon monoxide have been evaluated for a few of these psychological abilities. MacFarland, et al.[20] demonstrated a significant degree of impairment in visual discrimination for brightness when the level of carboxyhemoglobin in their subjects reached 4 per cent. Lilienthal and Fuggitt[18] found an impairment in the frequency of flicker-fusion in subjects with levels of carboxyhemoglobin between 5 and 10 per cent. Trouton and Eysench[25] have reported the development of impairment in control precision and multiple limb coordination in subjects when the concentration of carboxyhemoglobin in their blood exceeded 5 per cent.

I. Purpose. It was the purpose of this study to determine whether alterations in some of the other functions of the higher centers in the central nervous system could be demonstrated at levels of carboxyhemoglobin lower than those which are necessary to produce subjective symptoms or alterations in the physiological functions of other body tissues. Additional aims were to determine the minimum level of carboxyhemoglobin at which measurable alteration of a function begins, and to correlate the amount of change in each function with the increase in the level of carboxyhemoglobin.

II. Experimental Procedure. Volunteer subjects were obtained for this study from the Cincinnati Fire Department. Each volunteer was given a preliminary interview and a physical examination. The physical examination was directed toward the elimination of those individuals having any physical defects which might interfere with the testing procedures.

Upon completion of the history and physical examinations, each subject was given an explanation of each of the tests to be used. These tests included:

a) pulse and respiratory rates, and blood pressure
b) color stimulus response test
c) letter stimulus response test
d) carboxyhemoglobin determination using the microgasometric method of Scholander and Roughton[24]
e) plural noun underlining test

f) test of neurological reflexes
g) static steadiness test
h) arithmetic test
i) muscle persistent test
j) $\underline{t}$ crossing test
k) time of onset of subjective symptoms.

The completion of one set of each of these tests constituted one testing cycle. The sequence of testing procedures was arranged so that the measurements of physiological activities were interspersed among the psychological tests to eliminate, or minimize as much as possible, the effects of boredom, fatigue, and other factors which might otherwise confound the results. Each subject was evaluated during four consecutive testing cycles.

To obtain a wide range of concentrations of carbon monoxide in the blood of the subjects during each of the four testing cycles, the subjects were divided into one of several groups with respect to exposure to carbon monoxide. Table 2 shows the schedule of exposure for each of the different groups of subjects.

Table 2

Schedule of Exposure to Carbon Monoxide

Group	1st Cycle	2nd Cycle	3rd Cycle	4th Cycle
Ia	CO	air	air	air
Ib	air	CO	air	air
Ic	air	air	CO	air
Id	air	air	air	CO
IIa	CO	CO	air	air
IIb	air	CO	CO	air
IIc	air	air	CO	CO
IIIa	CO	CO	CO	air
IIIb	air	CO	CO	CO
IV	CO	CO	CO	CO
V	air	air	air	air

The subjects were tested individually in a quiet, well-lighted and well-ventilated room. After completing the explanations concerning the study and answering any questions, the subject was seated comfortably at the testing table and an oxygen mask was adjusted to his face. This mask was fitted with an intake and an exhaust valve designed to prevent the subject from re-breathing his expired air. The intake valve was connected by means of a large diameter flexible rubber hose to a three-way valve positioned so that the investigator controlled the subject's breathing medium and could supply air either directly from the room's atmosphere or from a gas cylinder without the subject's knowledge of his source of air. The gas cylinders used in this study contained approximately one hundred parts of carbon monoxide per million parts of air.

The subject was told that he would wear the mask throughout the entire testing period. He was assured that he would not get enough carbon monoxide to cause him any physical harm. He was also told that he would not know if or when he was breathing the mixture of carbon monoxide and air, since it is odorless and tasteless. The simple choice color response and simple choice letter response tests were demonstrated and the subject was allowed a preliminary period of practice performing these tests while breathing room air through the oxygen mask. When the subject was completely oriented, the testing was begun.

III. Results. Forty-nine healthy adult males were used as subjects in this study. The mean age for the group was thirty-seven and a half years with a median age of thirty-nine years. Table 3 shows their age distribution in increments of five years.

Table 3

Age Distribution of Subjects

	25-29	30-34	35-39	40-44	45-49	50-55
Number of Subjects	8	9	10	9	10	3

The variation in time and amount of exposure to the mixture of carbon monoxide and air resulted in levels of carboxyhemoglobin in these subjects ranging from 0 to 20.4 per cent. One subject reported that he had developed a headache during the testing. His headache began when the level of carboxyhemoglobin in his blood reached 20.4 per cent. The remaining forty-eight subjects denied the existence of this or any other subjective symptoms which could be attributed to carboxyhemoglobinemia. There was no change in the spinal or cranial nerve reflexes in any of the subjects throughout the study. Furthermore, there was no impairment in static steadiness at any time.

The results obtained from the remaining sixteen physiological and psychological activities are recorded in Tables 4 and 5*. Table 4 gives the number of observations, the mean levels and response, the ranges of response and the correlation coefficients between the particular measurement for each of these activities and the level of carbon monoxide in the blood. These results show that there was no correlation between the level of carboxyhemoglobin in the blood and any of the physiological activities which were evaluated. Furthermore, there was no correlation between the level of carboxyhemoglobin in the blood and the reaction time in the simple choice response tests. There was a definite, appreciable and statistically significant relationship between the level of carboxyhemoglobin in the blood and all other psychological activities with the exception of errors in the plural noun underlining.

Those variables demonstrating a significant correlation between the

*See pages 34 and 35.

level of carboxyhemoglobin and the degree of impairment were analyzed further to determine the relationship of age, smoking habits, test interaction and the cyclic nature of the testing procedure to the degree of impairment. There was no evidence of cyclic effects upon the results of the tests, and there was no apparent difference between the test results of the nonsmokers and those of the smokers (although the number of nonsmokers was too small to draw statistically significant conclusions).

The measurements obtained from each of these tests were further divided into 20 groups by level of carboxyhemoglobin (0 to 0.4, 0.5 to 1.4, 1.5 to 2.4, etc., up to 19.5 to 20.4 per cent) and the mean and range at each level were determined and plotted. Table 5 shows the mean at each level of carboxyhemoglobin for these abilities.

The results indicate that there is a significant increase in the number of errors in the letter and color response tests and in the completion time in the plural noun underlining test which should be detectable when the level of carboxyhemoglobin reaches 3 per cent.

The results show that both the completion time and the number of errors in the arithmetic and in the t crossing tests is increased when the level of carboxyhemoglobin is increased. This increasing impairment in completion time and number of errors should be detectable at levels of carboxyhemoglobin between 1 and 2 per cent when an adequate number of subjects is evaluated.

IV. Discussion. Subjective symptoms did not occur, nor were any physiological activities affected at levels of carboxyhemoglobin below 20 per cent. These results are in agreement with those reported by Killick[16], Lilienthal[19], von Oettingen[21], and others[5, 12, 22].

Psychomotor abilities were sensitive in varying degrees to the presence of carbon monoxide in the blood. Reaction time, static steadiness and muscle persistence were not measurably altered by concentrations of carboxyhemoglobin up to 20 per cent; whereas, choice discrimination clearly indicated beginning alteration at levels of carboxyhemoglobin below 5 per cent.

With the exception of the number of errors in the plural noun underlining test, the tests of cognitive abilities were also highly sensitive to the presence of carbon monoxide in the blood as shown by a progressive increase in the number of errors and in completion time with increasing levels of carboxyhemoglobin. This increase in number of errors and completion time is detectable at levels of carboxyhemoglobin below 5 per cent.

Alteration of function due to exposure to carbon monoxide occurred earliest in the higher centers of the central nervous system in that area (or areas) of the brain which controls some of the cognitive and psychomotor abilities. This alteration can and does occur at much lower levels of carboxyhemoglobin than those which are necessary to produce subjective symptoms or alter physiological signs. Furthermore, the degree of alteration in psychological abilities may be quite profound before any clinical signs or subjective symptoms are elicited. As seen in Table 5 there was a tenfold increase in number of errors in choice discrimination when the level of carboxyhemoglobin in the blood reached 20 per cent.

Table 4

Results of Physiological and Psychological Tests

Test	Number of Observations	Mean (Range)	Correlation Coefficient
Pulse Rate	156	72(55-102)/Min.	-0.047
Systolic B.P.	156	122(102-155)mm Hg	-0.004
Diastolic B.P.	156	78(55-90)mm Hg	-0.025
Respiratory Rate	156	12(9-17)/Min.	-0.020
Muscle Persistence Time, Left Leg	156	27(19-47) Min.	0.035
Muscle Persistence Time, Right Leg	156	28(19-51) Min.	0.035
Letter Responses	167	69.6(49-98)/Min.	0.001
Color Responses	167	71.2(51-99)/Min.	0.078
Errors in Letter Response	167	18.0(0-116)	0.906*
Errors in Color Response	167	18.7(0-115)	0.847*
Completion Time Pl. Noun Underlining	196	186.8(87-317) Sec.	0.812*
Completion Time Arithmetic	196	835(501-1453) Sec.	0.665*
Completion Time t Crossing	196	123(43-291) Sec.	0.792*
Errors in Plural Noun Underlining	196	17.7(1-46)	-0.053
Errors Arithmetic	196	4.6(0-12)	0.590*
Errors t Crossing	196	3.4(0-14)	0.539*

*Significant at the 0.001 Level

Table 5

Mean of Test Response at Each Carboxyhemoglobin Level

COHb%	Number of Observations	Response Errors Letter	Response Errors Color	Plural Noun Time	Arithmetic Time (Sec.)	Arithmetic Errors	t Crossing Time (Sec.)	t Crossing Errors
00.0	64	9.1	8.4	166	778	3.7	91	1.85
1.0	2	7.0	1.0	147	932	6.3	91	2.50
2.0	5	5.6	7.0	154	759	4.1	107	2.33
3.0	14	10.0	9.8	178	790	5.7	92	2.60
4.0	4	10.5	12.5	184	644	5.0	81	3.00
5.0	9	17.3	19.5	176	867	4.9	124	5.69
6.0	1	6.0	7.0	170	776	4.5	149	3.67
7.0	12	20.2	20.8	165	787	3.6	109	2.20
8.0	3	21.0	25.6	252	902	5.3	162	3.60
9.0	3	28.0	28.6	202	840	2.5	72	9.00
10.0	8	22.5	24.2	199	963	7.4	144	4.70
11.0	5	18.2	21.4	207	835	4.6	152	2.83
13.0	6	23.0	33.3	216	1039	3.2	107	3.25
14.0	6	30.0	32.6	226	944	6.5	148	5.50
15.0	7	38.6	37.9	237	1110	4.3	158	3.13
16.0	10	41.2	41.9	235	835	6.0	220	3.75
17.0	2	32.0	36.0	222	---	---	---	----
18.0	5	38.6	43.2	244	1064	6.2	233	6.80
19.0	2	----	----	---	1015	6.0	299	8.00
20.0	2	70.0	83.5	208	---	---	---	----

Years of experience have supported the belief that an eight-hour a day exposure to the recommended Maximum Allowable Concentration of 100 parts per million of carbon monoxide[15] does not adversely affect the health of the average worker. The results of this study do not contradict these beliefs; but, there are strong indications that levels of carboxyhemoglobin which are physiologically safe can nevertheless produce impairment of psychological skills which may be a safety hazard for the worker (rather than a health hazard) and may also greatly reduce efficiency and productivity.

Since the relatively simple cognitive abilities required to perform choice discrimination, arithmetic, plural noun underlining, and t crossing tests were impaired by low levels of carboxyhemoglobin, it is highly possible that more complex psychological functions involving judgments, and situational decisions and responses would be greatly affected by exposure to levels of carbon monoxide which are sufficient to produce concentrations of carboxyhemoglobin in the blood between 5 and 20 per cent.

Astronauts, airplane pilots, train engineers and many others who must make accurate judgments, correct decisions, and rapid responses in the performance of their duties are exposed to low levels of carbon monoxide in their working environment. Is it necessary to lower the maximum allowable concentration of carbon monoxide in their working environment? Additional studies of the effects of carbon monoxide on other psychomotor and cognitive abilities including decision making, intelligence, learning, and situational tests are definitely indicated.

V. Summary and Conclusions. The effects of exposures for varying lengths of time to an atmosphere containing 100 parts per million of carbon monoxide were measured in a group of forty-nine healthy men between twenty-five and fifty-five years of age. This exposure produced levels of carboxyhemoglobin in the blood of the subjects ranging from 0 to 20.4 per cent.

Impairment of function due to exposure to carbon monoxide occurred earliest in the higher centers of the central nervous system in that area (or areas) of the brain which controls some of the cognitive and psychomotor abilities. Impairment is detectable at levels of carboxyhemoglobin below 5 per cent and the degree of impairment increases with increasing concentration of the carboxyhemoglobin in the blood.

The need for reducing the maximum allowable concentration of carbon monoxide in the working environment has been speculated upon.

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RESERVE SECTION

Some Plain Talk for Junior Officers

Reprinted from a letter to Reserve Officers written by RADM John S. Lewis, USN—Retired, Executive Director of the Naval Reserve Association, 1025 Connecticut Ave., N. W. Washington 6, D. C. Published by special permission of the author.

Young officers who have completed their obligated active duty service, and who decide to participate in the Naval Reserve program on inactive duty are generally motivated by a desire for one of the following: (1) To continue to enjoy the experiences, the way of life and the friendships which they experienced on active duty, and by a patriotic desire to make a continuing contribution to national defense. (2) To earn drill pay and active duty for training pay to augment their civilian income. (3) To realize retired benefits, including retired pay on reaching age sixty. (4) To avail themselves of educational opportunities which may help them in their civilian occupations. (5) To gain increased rank in the Naval Reserve—for their own satisfaction and to enhance their prestige and reputation among their Naval Reserve associates and in their communities.

If you are now participating in the Naval Reserve program on inactive duty, regardless of your personal motivation, you probably believe that the contribution of your time—at the expense of your family, recreational or civic activities—will be rewarded by regular promotion and the achievement of retired benefits. This could not be farther from the truth! It is important that you understand why this is so.

When an officer has decided to participate in the Naval Reserve program on inactive duty, he immediately has another decision to make—how and where to participate. There are a number of factors which influence his decision: (1) His geographical location and the types of Naval Reserve units in that area. (2) The numbers and types of billets, both pay and nonpay, which may be open to him. (3) Family, personal and business commitments which may restrict the days of the week or the hours he can attend drills.

Some particularly fortunate young officers have a choice of units with which to affiliate. Some of them elect to acquire minimum promotion potential in a personally convenient method. This is not always conducive to promotion, particularly in the more senior ranks. Other young officers limit their opportunities for affiliation by an unwillingness to take active duty for training, or to sign a Ready Reserve Agreement. With reservations of this nature, they are laboring under a severe handicap from the very beginning as far as promotion is concerned. 55% of the officers who have participated in the Naval Reserve program for a period of fifteen years, and who have achieved the rank of Lieutenant Commander, will not be promoted, and some of them will not even become eligible for retired benefits. Unfortunately, promotion to the rank of Lieutenant Commander often creates a false sense of security. Many officers who have faithfully attended drills, who have taken active duty for training, and who have been regularly promoted to the rank of Lieutenant Commander are disillusioned, and even bitter, when they thereafter fail of selection to the rank of Commander. There are good reasons why they can participate faithfully and still reach the end of the road in the rank of Lieutenant Commander. It is because they have failed to direct their efforts in the proper channels. In the junior ranks participation is the most important factor, but in the senior ranks the emphasis is on participation appropriate to your designator.

Promotion is tangible recognition for participation and performance but is necessarily based upon the officer's potential for assuming increased responsibility in (a) the next higher rank and (b) in a specific mobilization billet. This is no different from the factors that are considered for promotion in industry in civilian life. Promotion brings with it increased prestige, higher pay and greater retired benefits. Naval Reserve Officers who profess to have no interest in promotion are either not being honest with themselves or they are wasting their time in the Naval Reserve program. Promotion to the ranks above Lieutenant Commander is a highly selective process based upon an assessment of the future usefulness of the officer to the Navy and, in case of Naval Reserve Officers, it is measured in terms of his potential for service on active duty in the event of a national emergency, i. e., mobilization potential.

Because the Navy had a fixed pattern for your training and duty assignments from the time of your commissioning until the completion of your obligated active duty, you may believe that you will receive similar guidance in your Naval Reserve activities on inactive duty. This is not so. At the present time, and in the foreseeable future, you are to be left largely to your own devices as to how and when you participate, what duty assignments you receive, what

active duty for training you take and what correspondence courses you complete. Generally speaking, unless you receive experienced and knowledgeable advice you will be "flying blind." Unless you are blessed with an overabundance of good luck, it will be just a matter of time before you run aground. The best advice you can follow is contained in these five cardinal points: (1) Your participation with a Naval Reserve Unit, your active duty for training, and your correspondence course activity, must be appropriate to your designator. Unless you can obtain a training appropriate to your designator, you should request a change of designator. (2) Your promotion essentially depends upon high-quality performance as evidenced by your fitness reports, and (3) Your record must reflect assignments of increasing responsibility. (4) You must have regular periods of active duty for training, preferably in your mobilization billet. (5) Your participation must to all intents and purposes, be continuous. Where your personal affairs make drill attendance difficult or even impossible for a year or two, you must make every effort to continue your professional development through correspondence courses and active duty for training.

When you find you are not meeting all of the foregoing criteria, you would do well to review your personal situation objectively to determine whether you can change the pattern of your Naval Reserve activities and whether continued participation in the Naval Reserve program is justified. Failure of selection to promotion is a sure sign that this review is needed.

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